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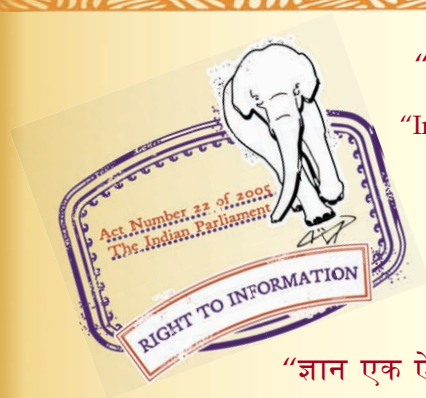
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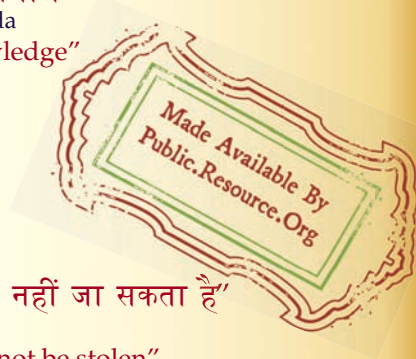
IS 5425-1 (1969): Methods of chemical analysis of misch metal, Part 1: Determination of cerium [MTD 7: Light Metals and their Alloys]



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“Knowledge is such a treasure which cannot be stolen”



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IS : 5425 ( Part I ) - 1969

(Reaffirmed 2003)

# *Indian Standard*

## METHODS OF CHEMICAL ANALYSIS OF MISCH METAL PART I DETERMINATION OF CERIUM

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# Indian Standard

## METHODS OF CHEMICAL ANALYSIS OF MISCH METAL

### PART I DETERMINATION OF CERIUM

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# *Indian Standard*

## METHODS OF CHEMICAL ANALYSIS OF MISCH METAL

### PART I DETERMINATION OF CERIUM

#### 0. FOREWORD

**0.1** This Indian Standard ( Part I ) was adopted by the Indian Standards Institution on 28 November 1969, after the draft finalized by the Methods of Chemical Analysis Sectional Committee had been approved by the Structural and Metals Division Council.

**0.2** Misch metal is an alloy of rare earth metals and is used for improving strength, fluidity and other properties of cast iron, steel, aluminium, magnesium and nickel alloys to which it is added. In this part, method for determination of cerium has been described. Method for determination of total rare earths will be covered in Part II.

**0.3** In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960\*.

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#### 1. SCOPE

**1.1** This standard ( Part I ) covers the method for the determination of cerium in various grades of misch metal as specified in IS : 4182-1967†.

#### 2. QUALITY OF REAGENTS

**2.1** Unless otherwise specified, pure chemicals and distilled water ( *see* IS : 1070-1960‡ ) shall be employed in the tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

#### 3. DETERMINATION OF CERIUM

**3.1 Outline of Method** — Cerium is oxidized with potassium persulphate and the cerium ( IV ) thus obtained is titrated with standard ferrous sulphate solution using ferroin as indicator.

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\*Rules for rounding off numerical values ( *revised* ).

†Specification for misch metal.

‡Specification for water, distilled quality ( *revised* ).

### 3.2 Reagents

**3.2.1 Dilute Hydrochloric Acid** — 2.5 N.

**3.2.2 Concentrated Sulphuric Acid** — sp gr 1.84 ( conforming to IS : 266-1961\* ).

**3.2.3 Potassium Persulphate** — solid.

**3.2.4 Silver Nitrate Solution** — 0.25 percent ( *w/v* ).

**3.2.5 Standard Ferrous Sulphate Solution** — Dissolve 9.8 g of ferrous ammonium sulphate [  $\text{Fe}(\text{NH}_4)_2(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$  ] in 200 ml of water and add 5 ml of concentrated sulphuric acid. Make up the volume to 250 ml. Standardize against standard permanganate or ceric sulphate solution.

**3.2.6 Ferroin** — M/40 solution.

### 3.3 Procedure

**3.3.1** Weigh accurately 2 g of the sample into a beaker. Add 50 ml of dilute hydrochloric acid to dissolve the sample. Make up the volume of the solution to 200 ml in a volumetric flask.

**3.3.2** Take 25.0 ml aliquot and add 5 ml of concentrated sulphuric acid. Evaporate to fumes. Cool and dilute to 200 ml. Add 1.5 g of potassium persulphate and 5 ml of silver nitrate solution. Boil for ten minutes and then allow to cool to room temperature.

**3.3.3** Titrate with standard ferrous sulphate solution till the yellow colour of ceric ion is barely perceptible. Then add one drop of indicator ( ferroin ) and complete the titration. At the end point, the solution changes sharply from a faint bluish green to red colour.

**3.3.4** Carry out a blank titration following the same procedure and using the same amounts of all reagents, but without the sample.

### 3.4 Calculation

$$\text{Cerium, percent} = \frac{(A - B) \times C \times 14.01}{D}$$

where

*A* = volume in ml of standard ferrous sulphate solution required for the test solution,

*B* = volume in ml of standard ferrous sulphate solution required for the blank,

*C* = normality of standard ferrous sulphate solution, and

*D* = weight in g of the sample represented by the aliquot taken.

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\*Specification for sulphuric acid ( revised ).

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